

Policy event: Forest bioeconomy and the alignment of multiple policy objectives

5th May 2026, Brussels



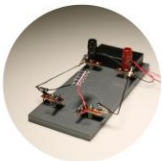
Materials for wellbeing Europe

Prof. Jaana Vapaavuori

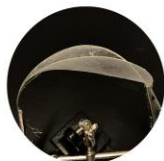
Aalto University



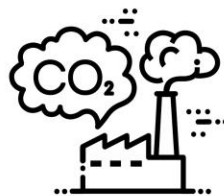
ROADMAP FOR COMPLEX LANDSCAPE

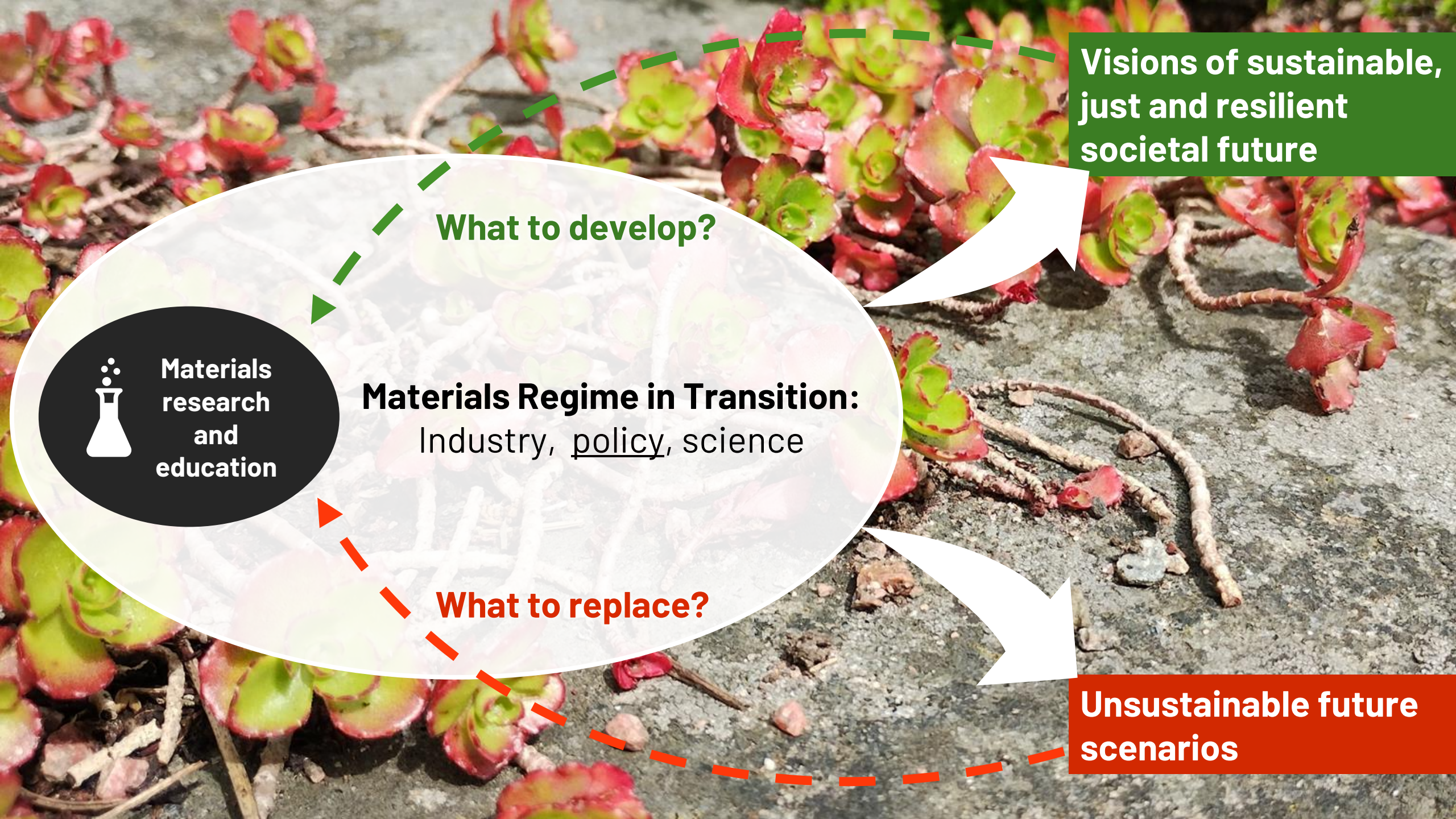


Highly-advanced
functional materials



More and more
pressing climate
anxiety





**Visions of sustainable,
just and resilient
societal future**

What to develop?

Materials Regime in Transition:
Industry, policy, science

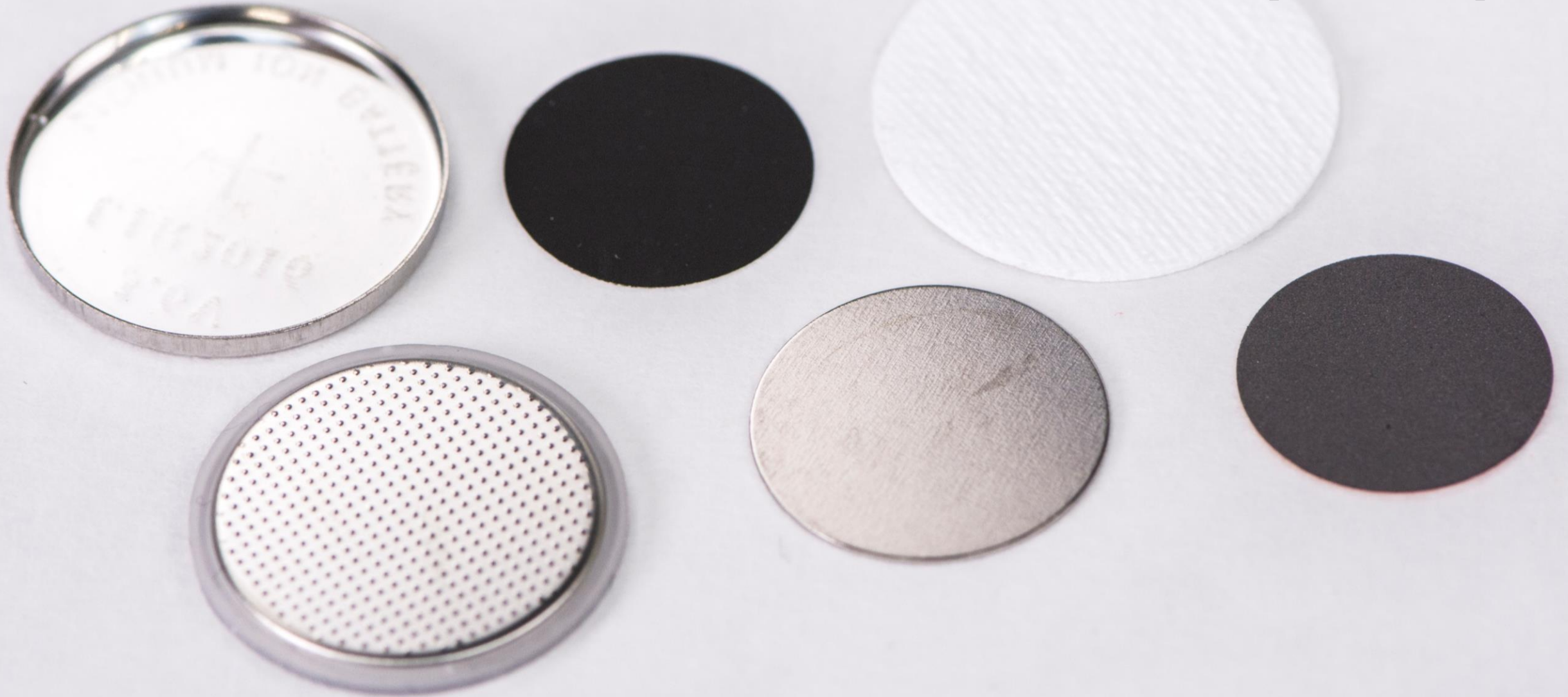
What to replace?

**Unsustainable future
scenarios**



**Materials
research
and
education**

Energy storage without critical raw materials (CRMs)

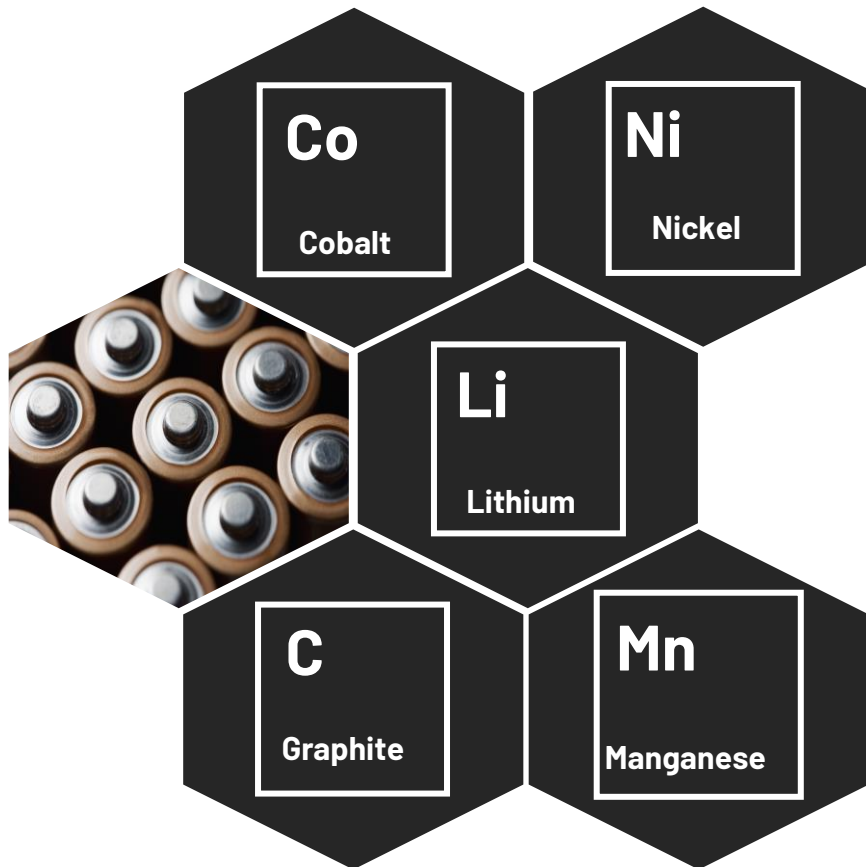


CRMs in energy storage

EU demand for lithium batteries powering our electric vehicles and energy storage set to

increase 12 times by 2030

(21 times by 2050).



The extraction of rare metals impact on local ecosystems and communities, e.g., causing water shortages.

63% of the world's cobalt is extracted in the Democratic Republic of Congo, while 60% is refined in China.

China dominates the world natural graphite production with a share of 67% in China.

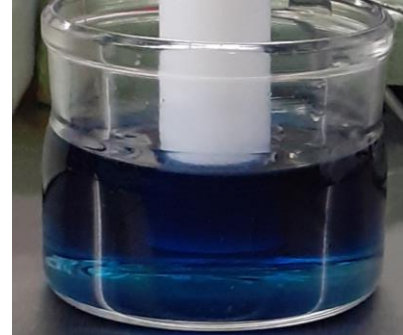
Our CRM-free bio-derived battery



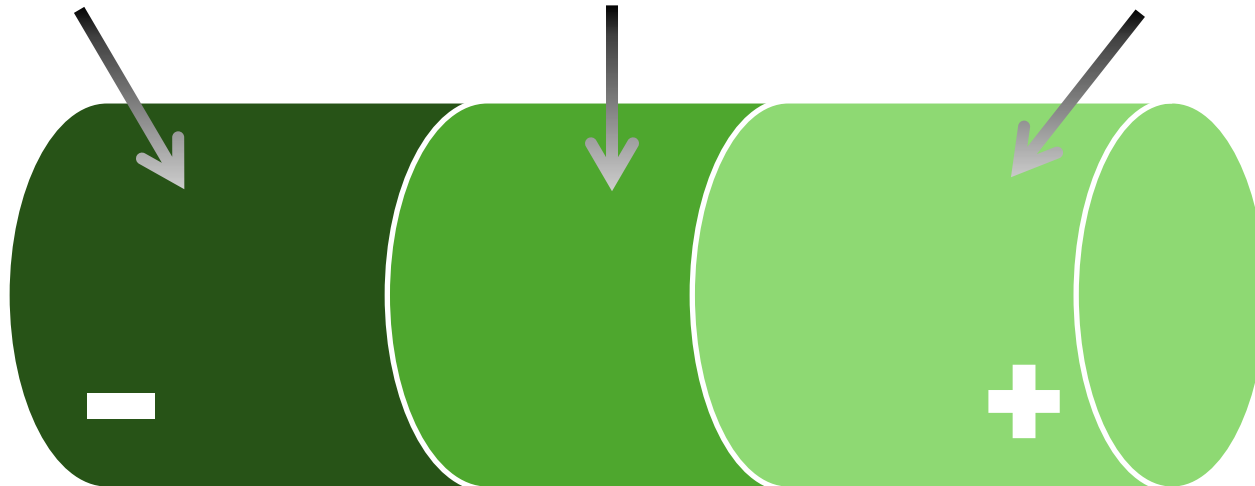
Hard carbon anode



Cellulose-based hydrogel electrolyte



Organic radical polymer cathode



Abundant bio-based resources



Excellent safety



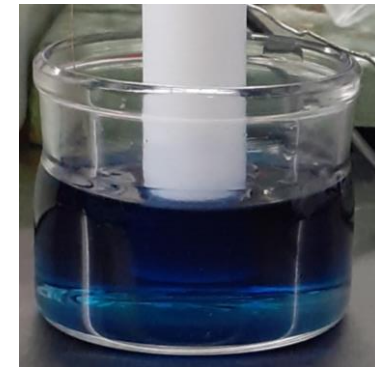
No critical raw materials



Instead of burning for energy, lignin can store energy
increasing resilience
and adding value



Hard carbon
anode



Organic radical
polymer cathode



**Living within
planetary boundaries**
by defossilizing
construction

Defossilize construction

around 40%
of energy
consumed in the
EU is used in
buildings

around 50%
of EU's gas
consumption is
attributable to
buildings

+/- 80%
of energy used in
EU homes is for
heating, cooling
and hot water

Better insulation could
save almost 50% of total
annual heating energy
consumed (777 TWh).



Advantages of bio-based materials



Versatility



**Insulation
properties**



Local sourcing



**Recyclability and
circularity**



GARDEN
LUPINE

Invasive plants

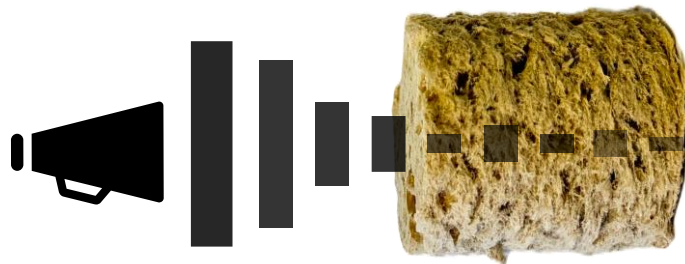


COMMON
REED



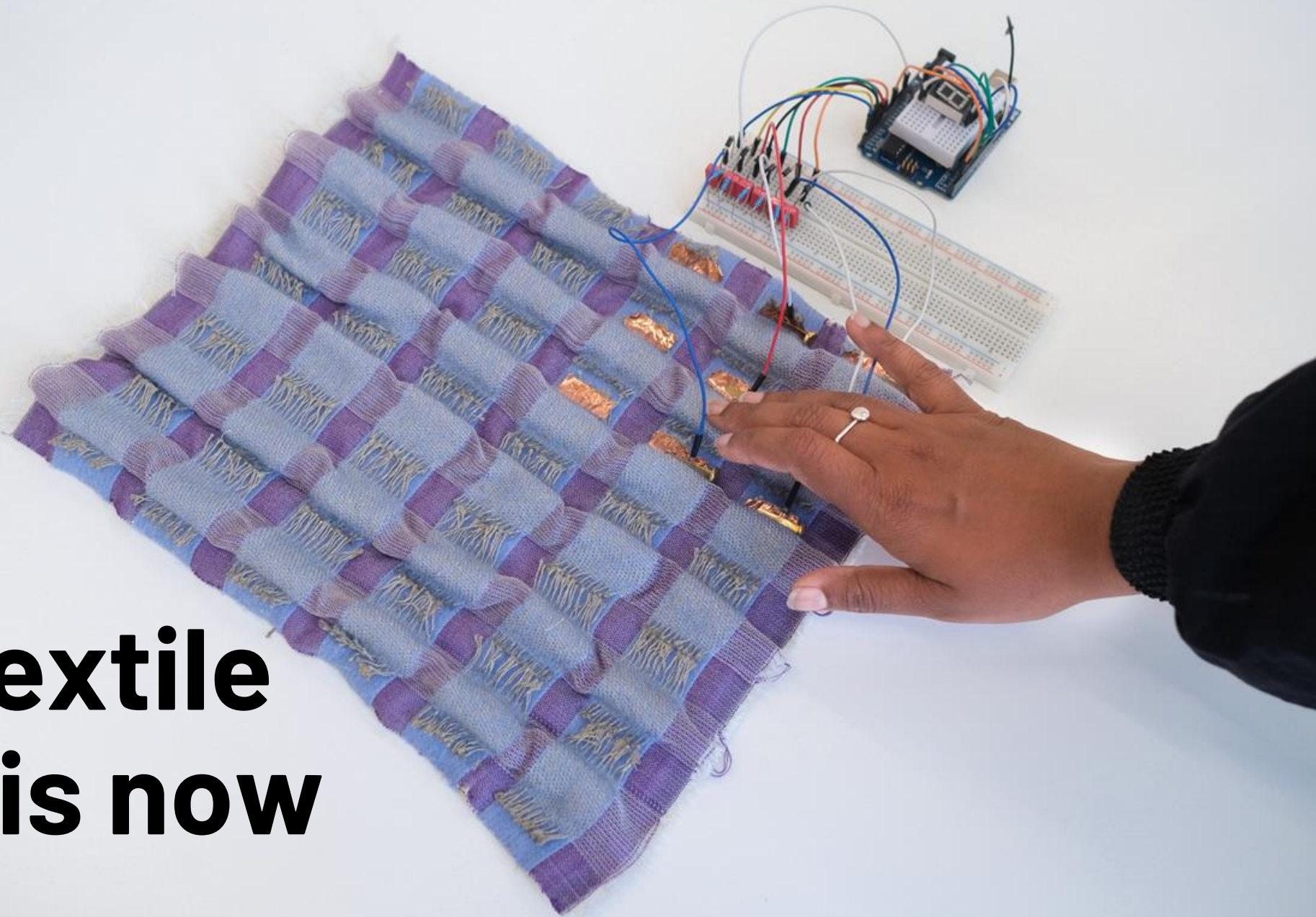
to

Functional heat and sound absorbing materials



**Performance of these materials
already exceeds the state-of-the-art
standard construction materials!**

**Time to
rethink textile
industry is now**



Painpoints of current textile industry

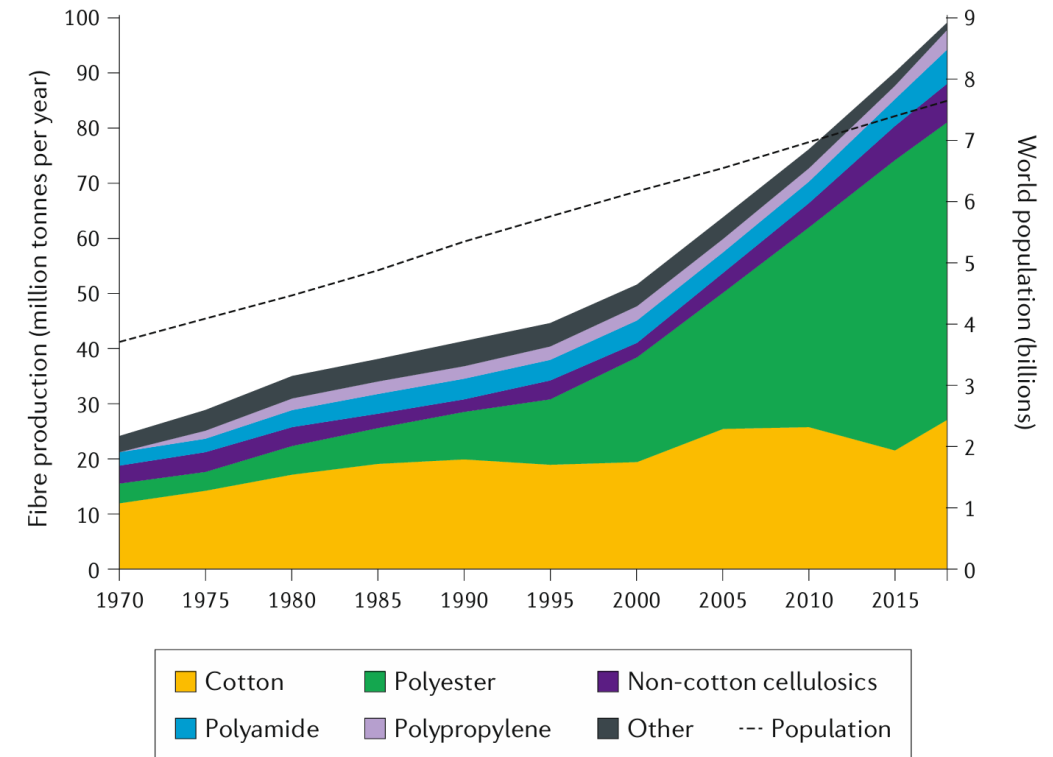
5 million tonnes

of clothing discarded each year in the EU - around 12kg per person

1%

of material in clothing is recycled into new clothing

Fashion brands are now producing almost twice the amount of clothing today compared with before the year 2000.



Textile innovations from Finland

**INFINITED FIBER,
INFINNA**



**METSÄ SPRING
KUURA**



SPINNOVA



IONCELL



**FORTUM
BIO2™TEXTILE**

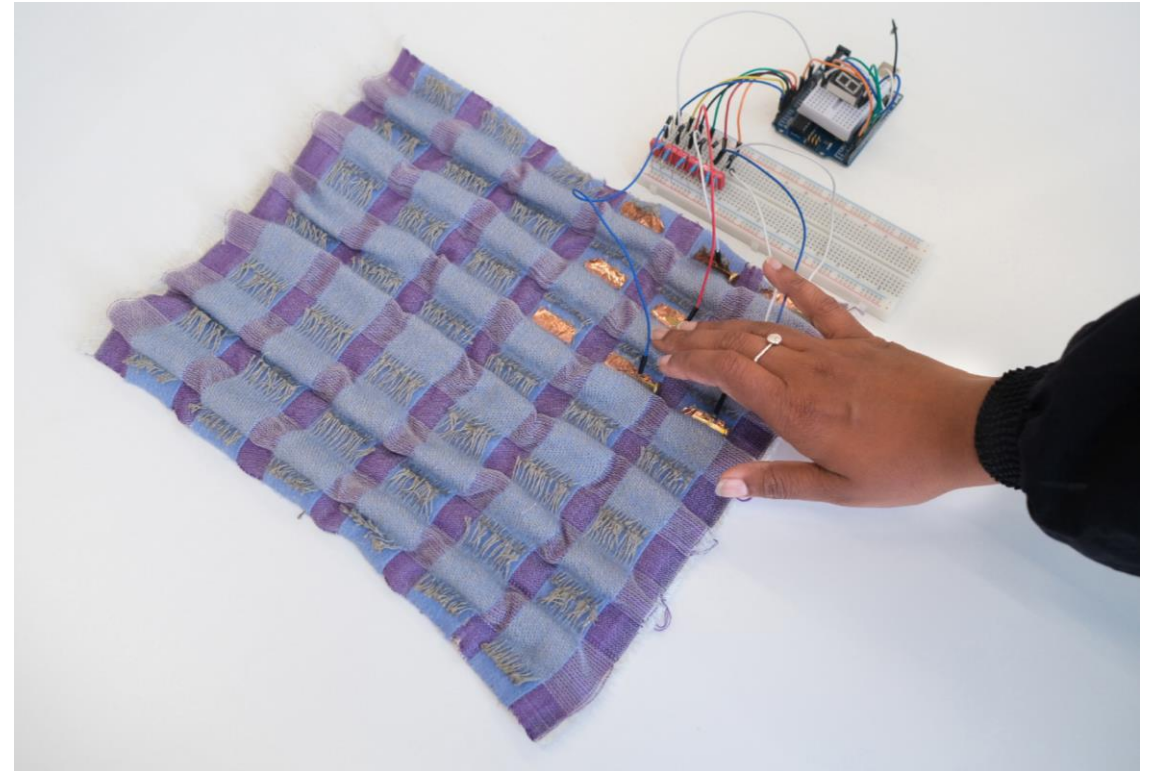
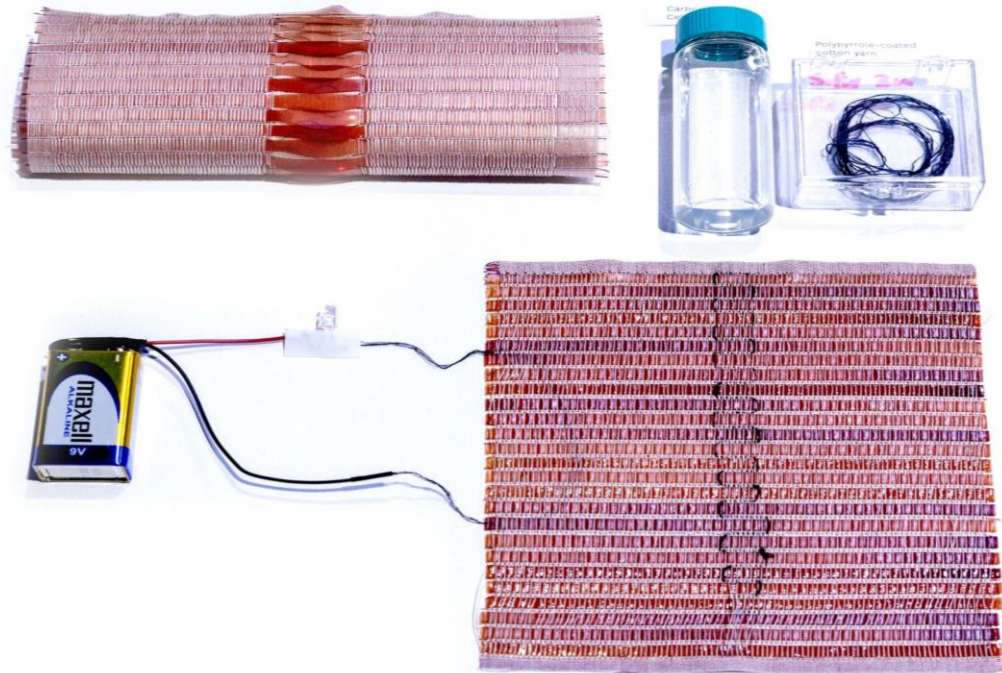


**NBG
NORRATEx**

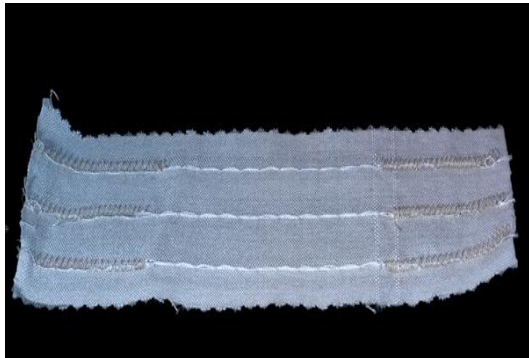


Textiles combining high value and advanced functionalities

Integrating biodegradable sensors for multifunctional wearables

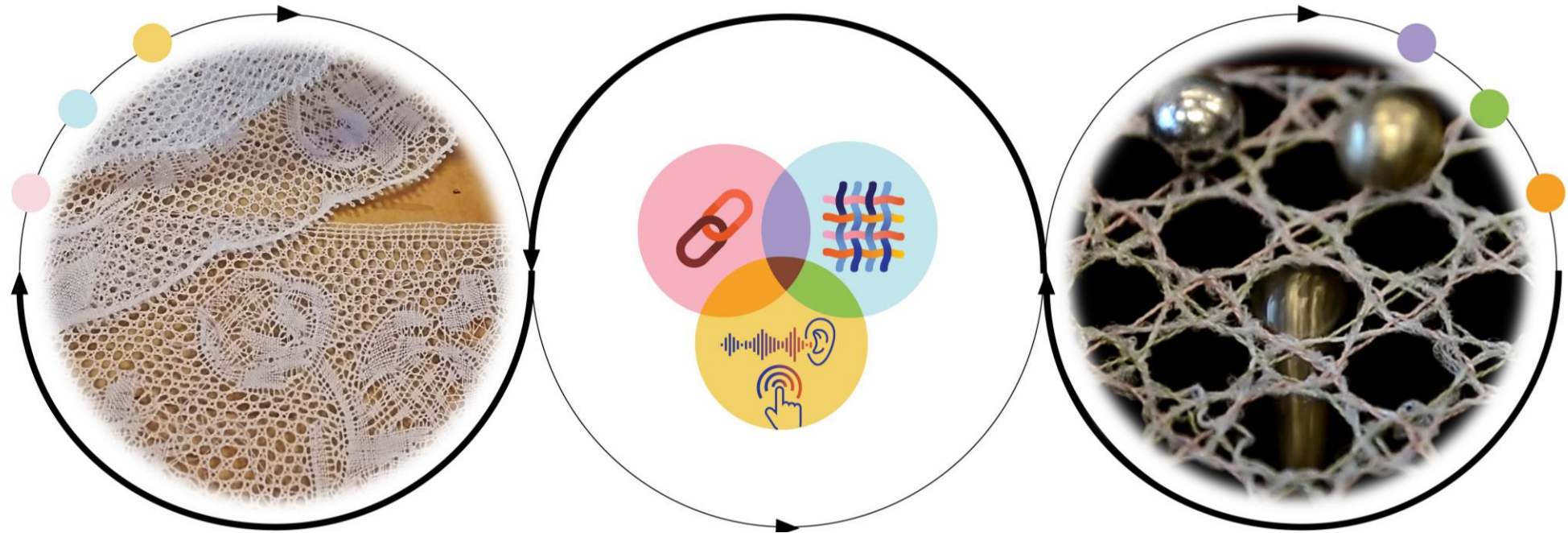


Weather-adapting interiors for climate-adaptive buildings



OPERATING ACROSS TIME SCALES

- accessing past and future

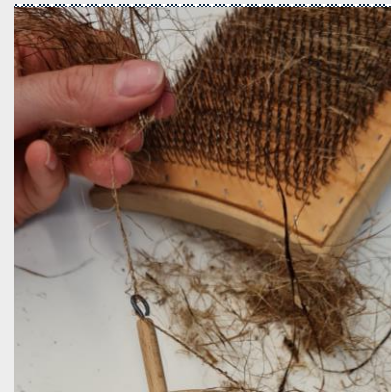




TRIAL



AND



ERROR

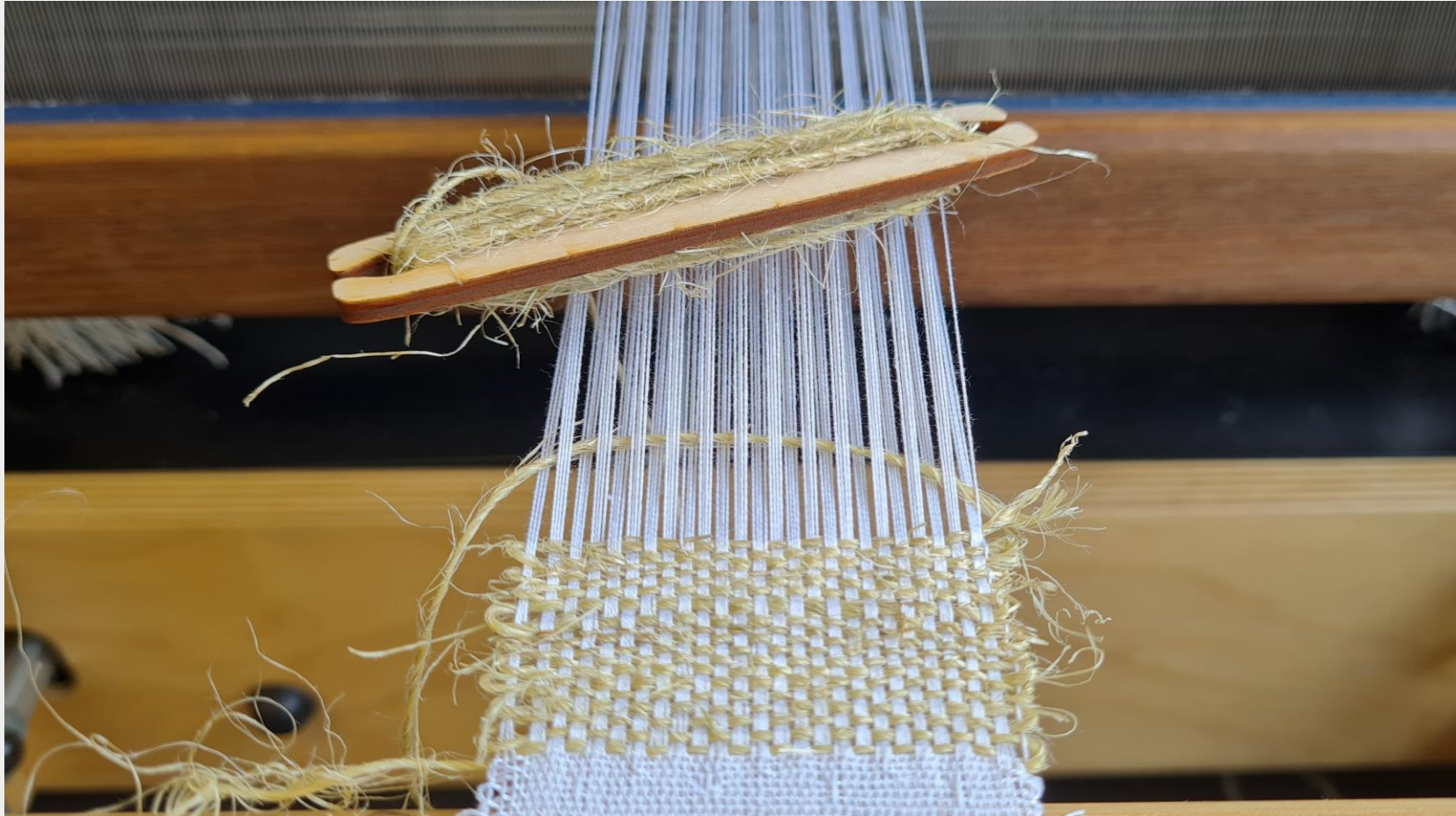


WOVEN SAMPLE

Warp / 100% Co, Nm 34,2

Weft / Handspun Lupine Yarn

Weave Structure / Rib 4-4



HUMIDITY-RESPONSIVE FABRICS

from local invasive plants



USABLE FUTURES, CUSTOMIZABLE SOFT INTERFACES

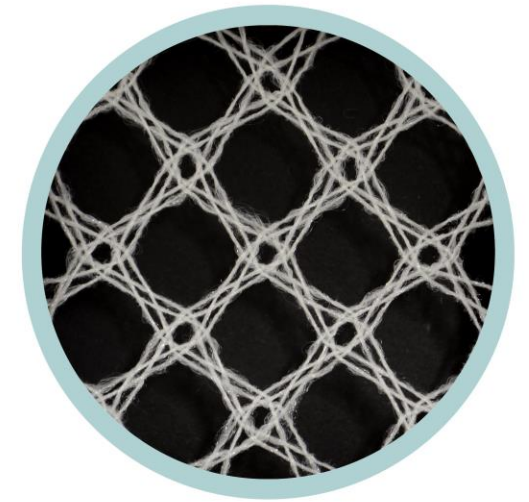
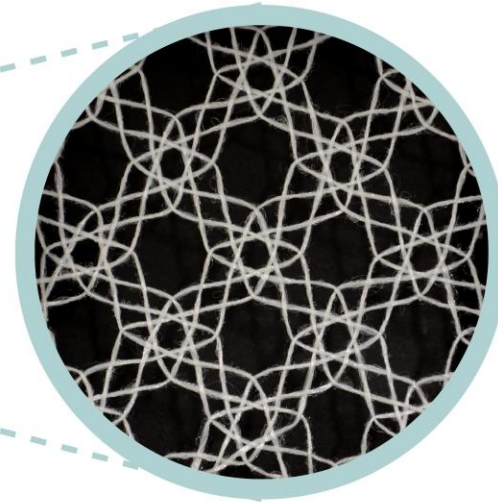


Image Source: <https://www.synwinchina.com/lb/garden-plant-frost-protection-fleece-pp-non-woven-fabric-suppliers.html>

ADAPTIVE AGRO-FABRICS FOR FUTURE'S CLIMATE AND INSECTS

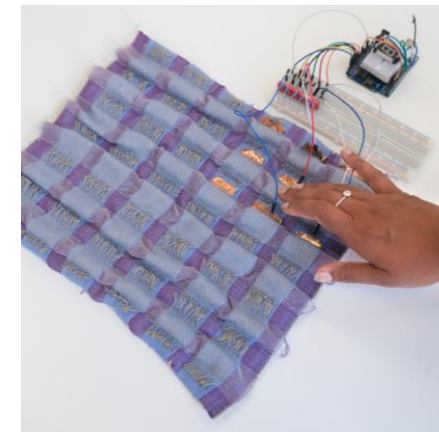
**MATERIAL
INNOVATIONS...**

**...CAN MAKE OR
BREAK THE VISION
OF WELLBEING
EUROPE**



EARLY-STAGE INNOVATIONS CONTRIBUTING TO MATERIAL WELLBEING OF FUTURE EUROPE

- We can build **batteries from fully local materials**
- We can significantly **increase the energy performance** of our buildings and combine it to increased living comfort
- We can **rethink our textile industry** and increase the health and **preventative health care services for the aging population**
- We can build the financial support systems to **speed-up from lab to market** and **level the playing field for sustainable innovations** to be valued



HOPE

- PALEA
- PEDRO
- MYNIA
- LENA

★ DON'T HAVE TO
★ CREATE MIND
★ MENTALLY NEUTRAL
★ PRODUCTIVITY

EQUILIBRIUM

THE WORLD IN BETWEEN

PEACEFUL COEXISTENCE
(BALANCED)

★ HARVEST
★ ENERGY

DIGITAL WORLD

PHYSICAL W.

★ CONTROLLED
NATURE ★

DECREASED
USE OF
RESSOURCES

CO2 SOURCE

PEOPLE

NON-HUMAN CENTRED

METAVERSE



PREVENT
PLANET
EXTINCTION

RESILIENCE

EQUALITY





**RADICAL
INTERDISCIPLINARITY**

**FORGING
VALUE-BASED
EMPOWERMENT
AND TRUST**

**HAPPY AND
RESILIENT
EUROPE**

**From the
materials
enabling happy
and resilient
Europe**

**Towards
working
policy**



FILM PREMIERE 25TH MAY

INNOVATION IN EVERY FIBER

SEMINAR 26TH MAY

Celebrating Eight Years of Research Impact
in Bio-Based Materials



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INNOVATION IN EVERY FIBER

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Film premiere 25th May 2026

- World premiere of Innovation in Every Fiber documentary movie
- Panel discussion: *Forest growth & economic growth: Can we achieve both?*

Seminar 26th May 2026

- Advances in green chemistry
- Futuristic applications of lignocellulosics
- The power of inter- and transdisciplinary research to drive systemic change

Register:



Register:






Research Council
of Finland

A!

Aalto University


FinnCERES
Materials Cluster



FLAGSHIP PROGRAMME

VTT